

UAF DMS Guidelines for MATH 113X –Numbers and Society

Across all sections of Math 113X offered by UAF campuses (delivered in person or online), all syllabi must minimally satisfy the following requirements.

Note: This course meets 1 hour per day 3 days a week (or should be set up for equivalent “class” time).

1. General guidelines set by UAF; follow this link to the [UAF syllabus requirements](#)
2. GER Information (sample statement below):

This course is listed as a General Education Math Course as such this course is expected to meet the general learning outcomes 1 and 2.

1. Build knowledge of human institutions, sociocultural processes, and the physical and natural works through the study of mathematics. Competence will be demonstrated for the foundational information in each subject area, its context and significance, and the methods used in advancing each.
2. Develop intellectual and practical skills across the curriculum, including inquiry and analysis, critical and creative thinking, problem solving, written and oral communication, information literacy, technological competence, and collaborative learning. Proficiency will be demonstrated across the curriculum through critical analysis of proffered information, well-reasoned solutions to problems or inferences drawn from evidence, effective written and oral communication, and satisfactory outcomes of group projects.

3. Text: Excursions in Mathematics by Tannenbaum, 9th Edition

- Chapter 1: 1.1-1.6 (r)
- Chapter 2: 2.1-2.4 (r)
- Chapter 9: 9.1-9.4 (r)
- Chapter 10: 10.1-10.5 (r)
- Chapter 14: 14.1-14.3 (r)
- Chapter 15: 15.1-15.3 (r)
- Chapter 16: 16.1-16.5 (r)
- Chapter 17: 17.1-17.4 (r)

4. Timing of material

For each of the following, the minimum time spent on the sections is listed.

This is a suggested outline with Mastery Assessments (score of 80% minimum) and comprehensive Final Exam.

Section Topic Approx. timing

1.1 The Basic Elements of an Election	1 day
1.2 The Plurality Method	1 day
1.3 The Borda Count Method	1 day
1.4 The Plurality-with-Elimination Method	1 day
1.5 The Method of Pairwise Comparisons	1 day
1.6 Fairness Criteria and Arrow’s impossibility Theorem	1 day
2.1 An Introduction to Weighted Voting	1 day
2.2 Banzhaf Power	1 day
2.3 Shapely-Shubik Power	1 day
2.4 Subsets and Permutations	1 day
Exam over Chapters 1 and 2	
9.1 Sequences and Population Sequences	1 day
9.2 Linear Growth	1 day
9.3 Exponential Growth	1 day

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9.4 Logistic Growth	1 day
10.1 Percentages	1 day
10.2 Simple Interest	1 day
10.3 Compound Interest	1 day
10.4 Retirement Savings	1 day
10.5 Consumer Debt	1 day
Exam over Chapters 9 and 10	
14.1 Enumeration	1 day
14.2 Measurement	1 day
14.3 Cause and Effect	1 day
15.1 Graphs and Charts	1 day
15.2 Means, Medians, and Percentiles	1 day
15.3 Ranges and Standard Deviations	1 day
Exam over Chapters 14 and 15	
16.1 Sample Space and Events	1 day
16.2 The Multiplication Rule, Permutations, and Combinations	1 day
16.3 Probabilities and Odds	1 day
16.4 Expectations	1 day
16.5 Measuring Risk	1 day
17.1 Approximately Normal Data Sets	1 day
17.2 Normal Curves and Normal Distributions	1 day
17.3 Modeling Approximately Normal Distributions	1 day
17.4 Normality in Random Events	1 day
Exam over Chapters 16 and 17	
Final Exam or Project	

5. Types of Assessments

- Exams
 - at least three exams during the semester
 - exams must be proctored and timed
 - use of non-graphing calculators are allowed in this course
 - exams must be majority written answer (not multiple choice)
 - exams must be paper-and-pencil exams, written and graded by faculty members
 - exams should not be reused from previous semesters, limited reuse of edited problems is acceptable
- Final Exam or Project
- Other Assessed Work
 - for online work through MyMathLab, mastery level (if used) should be no less than 75%
 - instructors should provide written feedback to students approximately weekly throughout the semester; this can be through humanly-graded assignments or email correspondence

6. Grading Policy

- The syllabus must include a grading scale of some form.
- Plus/minus grading is at the discretion of the instructor, but must be stated explicitly.
- Withdrawal and Incomplete policies must be stated explicitly.
- The final grade in this course must adhere to the following:
 - Written Assessed Work at least 15% and at most 30%
 - MyMathLab at least 10% and at most 20%
 - Exams at least 40%
 - Final or Project at least 15%

7. Tutoring Services

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DMS Math and Stat Lab: If you need extra math help, there is free tutoring available. The Math and Stat Lab is located in CHAP 305 and is staffed by Math Graduate students, upper-division Math students and Math faculty. This lab operates on a walk-in basis and schedules are posted that provide tutor times.

DMS One-on-one Tutoring: Free tutoring by appointment. This service is available to any UAF student registered in a core MATH course. Tutoring is available in CHAP 210. Appointments can be made for 30 minutes or an hour and can be scheduled up to two weeks in advance. Students can sign up for an appointment at <https://fairbanks.go-redrock.com>

DMS Online Tutoring: Free tutoring available Monday - Saturday! This service is available to any UAF student registered in a MATH or STAT course. Tutoring is accessible through Zoom. Appointments can be made for 30 minutes or an hour and can be scheduled up to two weeks in advance. To schedule an appointment students can sign up for an appointment at <https://fairbanks.go-redrock.com>

Assessment Criteria

Midterm Exams in this course should demonstrate the students' acquired knowledge of the following main topics.

- Problem Solving Skills
 - Developing and carrying out a solution path for non-routine problems
 - Explaining, reasoning, or justifying a solutions
- Manipulation of Abstract Symbols
 - Use appropriate notation
 - Summarizing procedures with appropriate formulas
 - Demonstrate ability to work with fractions
- Voting systems and Measures of Power
 - Correctly identify winners using the four different methods
 - Correctly rank candidates using the four different methods
 - Identify fairness criteria and/or use strategic voting
 - Find power distributions using Banzhaf and Shapely-Shubik
 - Find quotas, dictators, or players with veto power
- Population Growth Models
 - Find explicit and recursive expressions of sequences
 - Model populations with linear growth
 - Model populations with exponential growth
 - Model populations with logistic growth
 - Evaluate arithmetic/geometric sums
- Financial Math
 - Calculate simple/compound interest
 - Evaluate percentages, percent increase/decrease, stacked discounts, sale prices, etc.
 - Model installment loans/savings (find total amounts, contribution amounts, compare rates)
 - Model credit card usage (find average daily balance, periodic interest rates, finance charges, new balance)
- Censuses, Surveys, Polls, and Studies
 - Understand basic terminology
 - Use different sampling methods
 - Demonstrate understanding of sampling bias
- Basic Statistics
 - Bar graphs, box, plots, frequency tables, pie charts
 - Find measures of location (mean, median, quartiles, percentiles)
 - Find measures of spread (interquartile range, range, standard deviation, variance)
- Probability

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- Describe sample spaces
- Find probability of events
- Find expected value
- Determine risk
- Counting and determining size of spaces
- Differentiating between permutations and combinations
- Finding probability of events
- Normal distributions
 - Find mean and standard deviation
 - Use the 68-95-99.7 Rule
 - Differentiate between the honest-coin and dishonest-coin principles

For a project in this course students should show an understanding of how mathematics is used in everyday life or show how it is used in a particular application to the student's field of study.